

***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicants' submissions: amendments to the claims and remarks, filed on 04 August 2008, have been entered.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 3-6, 10-18, 20-31, 35-37, 39 and 41-65 are still rejected under 35 U.S.C. 103(a) as being unpatentable over Lashier et al (5,689,028), Araki et al (5,750,816) and Kreischer et al (6,380,451), considered separately.

Applicants' arguments filed 04 August 2008 have been fully considered but they are not persuasive. As previously set forth, Lashier et al ["Lashier"] disclose a process to regulate olefin production by deactivating the catalyst system which comprises the sequential steps of contacting a reactor effluent stream with an alcohol, removing and recovering any desired olefin product(s), adding an aqueous base to the reactor stream effluent, removing a solid product from the reactor stream effluent, separating organic and aqueous phases, adding an acid to the aqueous

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phase and recovering the precipitate. Lashier teaches that catalyst systems useful in the invention comprises a chromium source, a pyrrole-containing compound and a metal alkyl such as an aluminum alkyl. See column 1. Lashier teaches that the chromium source includes one or more organic or inorganic compounds including halogen-containing compounds. See column 1, line 55 to column 2, line 34. Lashier teaches that the pyrrole-containing compound can be any pyrrole-containing compound that will react with a chromium source to form a chromium pyrrolide complex. See column 2, line 35 to column 3, line 13. Lashier teaches that the alkylaluminum compounds may also be halogenated. See column 3. Reactants and reaction conditions are set forth in columns 4-5. Lashier teaches that suitable alcohol compounds have six or more carbon atoms and include 1-hexanol, 2-ethyl-hexanol, 1-heptanol, 1-octanol, and others. See column 6. No water content in the alcohol component is disclosed so the examiner is of the position that water-free alcohols are used. The examiner maintains the position that the process of Lashier appears to be indistinguishable from the claimed processes.

Applicants argue that the claims are not attempting to merely claim methods for catalyst system deactivation but are rather directed to processes having steps for deactivating a catalyst system and limiting or inhibiting the decomposition of a deactivated catalyst system.

Additionally, applicants argue that the claimed method may be particularly important in decreasing or eliminating the corrosion of equipment resulting from decomposition of the deactivated catalyst system in distillation towers. Applicants argue that the temperature of material passed through a reboiler of a distillation tower relates to olefin oligomerization product isolation, and that the reboiler temperature is a feature of product isolation and not a reaction condition. Applicants argue that the previous office action has failed to present a *prima facie*

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case of obviousness in relation to the pending independent claims. This is not deemed to be persuasive because Lashier teaches that after the catalyst deactivation, the olefin products can be removed by any removal process, preferably distillation. Further, Lashier teaches that any reaction conditions which can affect the above-mentioned steps are useful, and removal of the olefin product(s) by distillation was an above mentioned step. Reaction conditions are assumed to include temperature and pressure. In considering the disclosure of a reference, it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonable be expected to draw therefrom. Although Lashier does not teach the temperature of a reboiler in the separation of the olefin(s) product by distillation, the prior art teaches that any reaction conditions which can affect the above-mentioned steps, including separation of the same product(s) by distillation, can be used. The examiner is of the position that the skilled artisan would know what reboiler temperatures could reasonably be used to effectively run the olefin(s) separation process by distillation. The examiner is of the position that since the process of Lashier uses the same catalyst system as the claims, the same method of deactivation of the catalyst system by alcohols of the claims, and the same product recovery step of distillation as the claims, the reboiler temperature of less than 190°C most likely was also used since no decomposition of the catalyst system and no corrosion of the process equipment was taught. Further, the fact that applicants have discovered that at reboiler temperatures higher than 190°C the deactivated catalyst system decomposition begins to increase does not result in the patentability of a known process. Where the general conditions of a claim are disclosed in the prior art it is not inventive to discover the optimum or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 CCPA 1955.

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As previously set forth, Araki et al ["Araki"] discloses a process for preparing alpha-olefin oligomers using a chromium-based catalyst system comprising (a) a chromium compound, (b) at least one nitrogen-containing compound, and (c) an alkylaluminum compound. Arkai teaches that the process recovers the produced alpha-olefin oligomers, the catalyst components and the by-product polymers from the reaction solution. The prior art teaches that suitable chromium compounds are set forth in column 2, lines 42 et. seq. Suitable nitrogen-containing compounds include pyrrole and pyrrolide compounds as set forth in column 4. Araki teaches that the alkylaluminum compounds may be halogenated. See column 6. Araki teaches that the oligomerization process is carried out in a solvent and a compound soluble in the solvent and having a bonding ability to the chromium such as an alcohol compound is added to the reaction solution. Suitable alcohols include hexanol, heptanol, and diols. See column 12. Reaction conditions are set forth in columns 8-9. Araki teaches that the reaction effluent stream may then be supplied into a product distillation tower to recover the produced alpha-olefin oligomers as a distillate while concentrating the by-product polymers (i.e., heavies) and catalyst components which are recovered as a bottoms product. See column 2, lines 5-25 and column 9, lines 12-24. Although Araki does not set forth a reboiler distillation temperature of below about 190°C, Araki teaches that any reaction conditions which can affect the above-mentioned steps can be used. See columns 9-14. The examiner maintains the position that the process of Araki appears indistinguishable from the claimed processes.

Applicants argue that the claims are not attempting to merely claim methods for catalyst system deactivation but are rather directed to processes having steps for deactivating a catalyst system and limiting or inhibiting the decomposition of a deactivated catalyst system.

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Additionally, applicants argue that the claimed method may be particularly important in decreasing or eliminating the corrosion of equipment resulting from decomposition of the deactivated catalyst system in distillation towers. Applicants argue that the temperature of material passed through a reboiler of a distillation tower relates to olefin oligomerization product isolation, and that the reboiler temperature is a feature of product isolation and not a reaction condition. This is not deemed to be persuasive because Araki teaches that after the catalyst deactivation, the olefin products can be removed by any removal process, preferably distillation. Further, Araki teaches that any reaction conditions which can affect the above-mentioned steps are useful, and removal of the olefin product(s) by distillation was an above mentioned step. Reaction conditions are assumed to include temperature and pressure. In considering the disclosure of a reference, it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonable be expected to draw therefrom. Although Araki does not teach the temperature of a reboiler in the separation of the olefin(s) product by distillation, the prior art teaches that any reaction conditions which can affect the above-mentioned steps, including separation of the same product(s) by distillation, can be used. The examiner is of the position that the skilled artisan would know what reboiler temperatures could reasonably be used to effectively run the olefin(s) separation process by distillation. The examiner is of the position that since the process of Araki uses the same catalyst system as the claims, the same method of deactivation of the catalyst system by alcohols of the claims, and the same product recovery step of distillation as the claims, the reboiler temperature of less than 190°C most likely was also used since no decomposition of the catalyst system and no corrosion of the process equipment was taught. Further, the fact that applicants have

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discovered that at reboiler temperatures higher than 190°C the deactivated catalyst system decomposition begins to increase does not result in the patentability of a known process. Where the general conditions of a claim are disclosed in the prior art it is not inventive to discover the optimum or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 CCPA 1955.

As previously set forth, Kreischer et al [“Kreischer”] discloses a process of cleaning an oligomerization reactor after making a higher olefin in the reactor. The oligomerization reaction causes a co-product residue of the catalyst to form on the interior surface of the reactor. Suitable catalyst systems used in such a reaction include the combination of a chromium source, a pyrrole-containing compound and one or metal alkyls such as aluminum alkyl compounds. The interior surface of the reactor is then contacted with an alcohol under conditions effective to remove at least a substantial amount of the catalyst residue from the interior surface of the reactor. Kreischer teaches that the catalyst-removing step can be carried out by combining an alcohol with the process medium used in the reactor. Kreischer set forth reaction conditions in columns 7-9. Suitable alcohols have 6-12 carbon atoms and include 1-hexanol and 1-heptanol. Kreischer teaches that after the catalyst has been deactivated, the olefin product(s) are removed from the reactor effluent stream. Kreischer teaches that any removal process can be used although distillation is preferred for ease of use. See column 9, lines 63 to column 10, line 14. Although Kreischer does not set forth a reboiler distillation temperature of below about 190°C, Kreischer teaches that any reaction conditions which can affect the above-mentioned steps can

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be used. See columns 10-11. The examiner is of the position that the process of Kreischer appears to be indistinguishable from the claimed processes.

Applicants argue that the claims are not attempting to merely claim methods for catalyst system deactivation but are rather directed to processes having steps for deactivating a catalyst system and limiting or inhibiting the decomposition of a deactivated catalyst system.

Additionally, applicants argue that the claimed method may be particularly important in decreasing or eliminating the corrosion of equipment resulting from decomposition of the deactivated catalyst system in distillation towers. Applicants argue that the temperature of material passed through a reboiler of a distillation tower relates to olefin oligomerization product isolation, and that the reboiler temperature is a feature of product isolation and not a reaction condition. This is not deemed to be persuasive because Kreischer teaches that after the catalyst deactivation, the olefin products can be removed by any removal process, preferably distillation. Further, Kreischer teaches that any reaction conditions which can affect the above-mentioned steps are useful, and removal of the olefin product(s) by distillation was an above mentioned step. Reaction conditions are assumed to include temperature and pressure. In considering the disclosure of a reference, it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonable be expected to draw therefrom. Although Kreischer does not teach the temperature of a reboiler in the separation of the olefin(s) product by distillation, the prior art teaches that any reaction conditions which can affect the above-mentioned steps, including separation of the same product(s) by distillation, can be used. The examiner is of the position that the skilled artisan would know what reboiler temperatures could reasonably be used to effectively run the olefin(s)

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separation process by distillation. The examiner is of the position that since the process of Kreischer uses the same catalyst system as the claims, the same method of deactivation of the catalyst system by alcohols of the claims, and the same product recovery step of distillation as the claims, the reboiler temperature of less than 190°C most likely was also used since no decomposition of the catalyst system and no corrosion of the process equipment was taught. Further, the fact that applicants have discovered that at reboiler temperatures higher than 190°C the deactivated catalyst system decomposition begins to increase does not result in the patentability of a known process. Where the general conditions of a claim are disclosed in the prior art it is not inventive to discover the optimum or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 CCPA 1955.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ellen M. McAvoy whose telephone number is (571) 272-1451. The examiner can normally be reached on M-F (7:30-5:00) with alt. Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



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/Ellen M McAvoy/

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